Systems of Quadratics

A system of equations is ____

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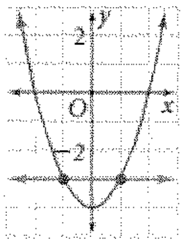
A system of equations can have zero, one or two solutions.

$y = x^2 - 4$
$y = -3$



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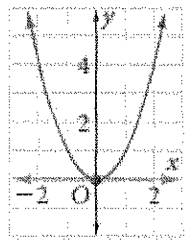
$y = x^2$
$y = 0$



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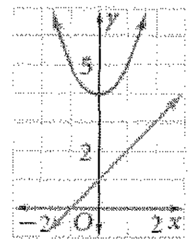
$y = x^2 + 4$
$y = x + 1$



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Solving a System: Two Methods

1.

2.

Graphically:

1. Graph the two equations
2. Where the two graphs ____________________, this is your ________________________.

Algebraically:

1. Make sure both equation are in y = form if necessary
2. Substitute the linear equation into the 'y part' of the quadratic equation, to have only one variable left to solve in the equation.
3. Get NEW quadratic equation into standard form (___________________________) and__________
4. **Since it is a quadratic:** Must **FACTOR TO SOLVE FOR X**.
(How many answers should you get?________)
5. Must find other variable (y) by substituting your x answers into one of the equation and solve for y.
6. Check solutions

Checking your Answer: To check on your graphing calculator (find intersection):

1) Go to [2nd] [Trace] (Calculate) and pick [#5] (intersection)

2) Move cursor to wanted intersection point [Enter] [Enter] [Enter]

Example 1: Solve the system of equations $y = -x^2 + 4x + 1$ and $y = -x + 5$ algebraically and by graphing

Example 2: Solve the system of equations algebraically and graphically.

$y = x^2 - 2$

$y = -x$

Practice Solving Graphically or Algebraically

1. Solve the following system algebraically: $y = x^2 - x + 2$, $y = 2x$

2. Find the solutions of the system algebraically: $y = -x^2 + 4x - 3$, $x + y = 1$

3. Solve for the solutions algebraically: $y = x^2 - 7x + 13$, $x - y = 2$

System of Equations Practice

Solve the **EVEN EXERCISES** by graphing and the **ODD EXERCISES** algebraically.

1. $y = x^2 + 3x - 5$
   $y = x + 3$

2. $y = x^2 - 4x + 6$
   $y = x + 2$

3. $y = x^2 - 10x + 14$
   $y - 7x = -16$

4. $y = x^2 - 24$
   $y + 12 = x$

5. $y = x^2 - 8x - 12$
   $y - 4x - 8 = 0$

6. $y = x^2 + 6x + 3$
   $y + 7 = 3x$

7. $y = x^2 - 9x - 18$
   $x + 3 = y$

8. $y = x^2 + 6x + 10$
   $2x + y = -6$

9. $y = x^2 + 8x + 16$
   $x + 6 = y$

10. $y = x^2 - 3x - 6$
    $y - 6 = x$

1. In making business plans for a pizza sale fund raiser, the Band Boosters at Enloe High School figured out how both sales income $I(n)$ and selling expenses $E(n)$ would probably depend on number of pizzas sold n. They predicted that $I(n) = -0.05n^2 + 20n$ and $E(n) = 5n + 250$.

a. Estimate value(s) for n for which $I(n) = E(n)$ and explain what the solution(s) of that equation tell about prospects of the pizza sale fund-raiser.

2. The stopping distance d in feet for a car traveling at a speed of s miles per hour depends on car road conditions. Here are two possible stopping distance formulas: $d = 3s$ and $d = 0.05s^2 + s$.

    a. Write and solve an equation to answer the question, "For what speed(s) do the two functions predict the same stopping distance?"

3. Given the equation $x^2 - 7x + 2 = 20 - x$

    a. Graph the problem. Explain how many solutions you expect to have.

    b. Find the solutions to this problem.

    c. Come up with a scenario that would correctly display this equation.

4. Given the equation $5x^2 = 25x$

    a. Graph the problem. Explain how many solutions you expect to have.

    b. Find the solutions to this problem.

    c. Come up with a scenario that would correctly display this equation.

5. The price C, in dollars per share, of a high-tech stock has fluctuated over a twelve-year period according to the equation $C = 14 + 12x - x^2$, where x is in years. The price C, in dollars per share, of a second high-tech stock has shown a steady increase during the same time period according to the relationship $C = 2x + 30$.

    a. For what values are the two stock prices the same? (Only an algebraic solution will be accepted.)

6. A rocket is launched from the ground and follows a parabolic path represented by the equation $y = -x^2 + 10x$. At the same time, a flare is launched from a height of 10 feet and follows a straight path represented by the equation $y = -x + 10$. Using the accompanying set of axes, graph the equations that represent the paths of the rocket and the flare, and find the coordinates of the point or points where the paths intersect.